

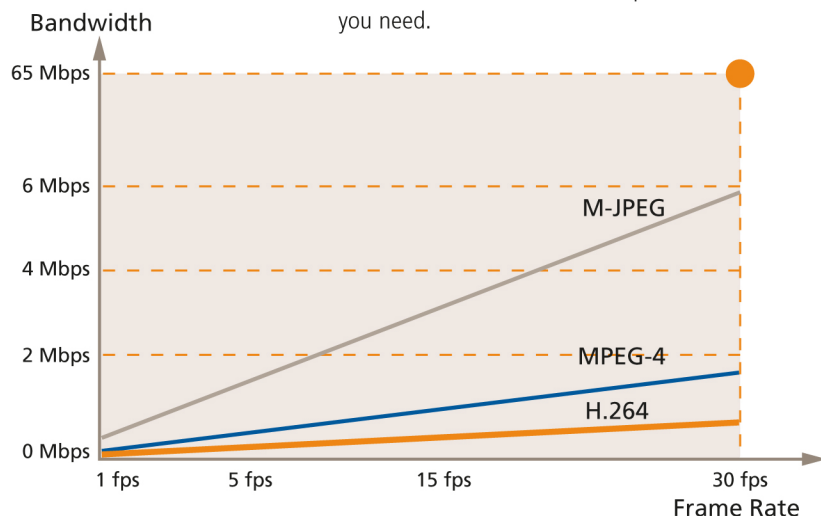
## TechTip

# Getting Ready for IP Cameras

**QUESTION:** My employer is planning to upgrade to IP cameras in the next few months and would like to have a better understanding of the factors that affect bandwidth consumption and storage.

**ANSWER:** There are many benefits to moving to IP cameras. Using an IP camera for video surveillance can provide much better quality video than analog cameras, but it will help if you have a better understanding of how things like bit rate, frames per second (fps), compression and image complexity affect bandwidth and storage.

The settings you choose determine the amount of information captured by the IP camera. This, in turn, determines the amount of bandwidth that you'll need to transfer the information to your backend system and how much storage space you will require. The challenge with IP cameras is to find the best balance between information captured and bandwidth consumed. You want to capture only as much information as is needed to provide excellent surveillance. You don't want to incur bandwidth costs for detail that isn't really going to help you resolve a security issue, but neither do you want to select the lowest settings in every instance to save bandwidth and end up with less detail than you need.



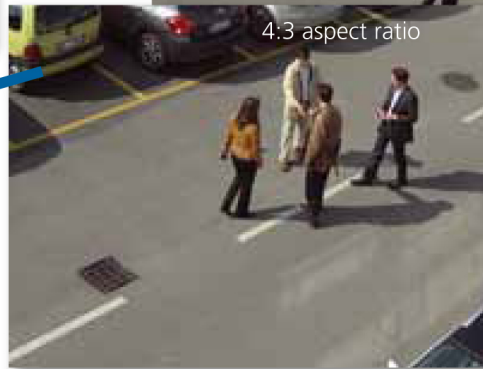
To get you started, here's a brief primer on some of the key variables you may encounter.

- **Compression:** You may have three choices for video compression: H.264, M-PEG4 and M-JPEG. H.264 is more efficient in compressing video, which reduces the storage required. I recommend selecting this option whenever you have a choice. On the opposite end of the spectrum, M-JPEG does not compress the image at all and requires the most storage.
- **Complexity:** What's going on in the camera's field-of-view (FOV) will affect bandwidth. A complex picture from a busy cafeteria, for example, will demand the highest amounts of bandwidth. A largely static scene with fewer elements, such as an empty hallway, will demand much less.
- **Bit rate:** There are two types of bit rate: variable bit rate (VBR) and constant bit rate (CBR). With VBR, the number of bits captured will change according to the complexity of the scene. This means that you will always get a predefined level of image quality. But bandwidth can vary widely depending on scene complexity. CBR will set the camera to always deliver a constant bit rate and change quality based on image complexity. By choosing a bit rate that still allows for a good picture during peak times, you will have the image quality you prefer and a very predictable storage requirement. Cameras that have VBR with a cap rate are the best option. They accommodate storage savings when the scene is less complex, but cap the rate when the scene gets very complex (like in complete darkness). By capping your rate, you are guaranteed not to exceed storage capacities.

License plates zoomed to 200%



16:9 aspect ratio allows wider field of view



4:3 aspect ratio

A standard D1 resolution image overlaid on a MegaPX 720p MiniDome image (1280x720)

- **Video resolution:** If a company invests in a 3MP or 5MP camera and sets it to 1080p, they are just wasting their money. Go ahead and set the camera to its full potential, resolution-wise. And make sure you get the most out of every single pixel by streaming to a suitable recorder capable of accommodating IP cameras and the higher resolution images you'll need to archive. March Networks' 8000 Series Hybrid recorders can accommodate up to 32 analog or IP cameras and boast onboard storage of up to 12 TB.
- **Frame rate:** Use the required frame rate for the application. Many cameras come defaulted at full frame rate, like 30 fps. Other than for casinos, this frame rate is typically not required. For places where you are trying to identify people, such as at a bank teller line, 2 to 4 fps should be sufficient because the subject is in the scene for long periods of time. In places like retail checkout lanes, where you need to see things moving at faster speeds, 8 to 10 fps is more common.
- **Daily storage:** As you can see, camera settings and scene complexity can affect the bandwidth needed. This has a direct impact on storage and the amount of storage required to meet individual retention policies.

The total impact IP cameras have on your network will depend on the settings you choose multiplied by the number of cameras. If you allocate resources wisely, your network should be able to handle the bandwidth load from dozens of cameras easily. However, if you select the highest settings for each variable on each camera, you could bog down your network unnecessarily.

Your best choice, now that you understand what's at stake, is to rely on the expertise of a certified systems integrator. Integrators are trained professionals who understand the tradeoffs between quality and bandwidth and can tailor your system to best meet your unique security needs. Now that you have a handle on some of the IP terminology, you'll be better equipped to evaluate the options a systems integrator provides.

You can also take advantage of our System Design Tool or other similar tools available online to estimate the impact IP cameras will have on your system. By varying settings in the tool, you can clearly see how different choices will affect your network and storage. While system design tools can aid in some estimates of storage and bandwidth required, it is best to test different settings to see the trade-off in image quality versus storage costs. ▼

